

Application Serial No. 10/623,983

IN THE DRAWINGS

The attached sheet of formal drawings replaces corresponding Sheet 1 of formal drawings filed on September 29, 2003, which includes FIGS. 1 and 2.

REMARKS

The present application was filed on July 21, 2003 with claims 1-18. In the outstanding Office Action dated May 4, 2005, the Examiner has: (i) objected to the drawings; (ii) rejected claim 9 under 35 U.S.C. §112, second paragraph, as being indefinite; (iii) rejected claims 1, 2, 5-8, 11-16 and 18 under 35 U.S.C. §102(a) as being anticipated by U.S. Patent No. 6,707,102 to Morikawa et al. (hereinafter "Morikawa"); and (iv) rejected claims 3, 4, 10 and 17 under 35 U.S.C. §103(a) as being unpatentable over Morikawa.

In this response, FIG. 1 has been amended in order to correct an error of a typographical nature, as suggested by the Examiner. A replacement Sheet 1, which includes FIGS. 1 and 2, is attached herewith. Applicants traverse the objection of the drawings with regard to FIG. 2. Applicants traverse the §112, §102 and §103 rejections of the claims for at least the reasons set forth below. Applicants respectfully request reconsideration of the present application in view of the above amendments and the following remarks.

FIG. 2 of the drawings has been objected to as "failing to comply with 37 C.F.R. 1.84(p)(4) because reference character 'DUMMY GATE' been used to designate both said dummy gate and said shielding electrode (222) in figure 2" (present Office Action; page 2, last paragraph). Applicants respectfully submit that the shielding electrode (222) shown in FIG. 2, of which the dummy gate is an example, is intended to include the conductive plug as well as the base portion (328 in FIG. 3C). For example, the Specification states that "[t]he dummy gate 222 may be formed as a conductive plug" (Specification; page 7, line 6). Since the base upon which the conductive plug is formed is also conductive, it functions in conjunction with the conductive as a portion of the overall shielding structure. Consequently, the designation of the dummy gate depicted in FIG. 2 is correct. Accordingly, withdrawal of the objection to the drawings is respectfully requested.

Claim 9 stands rejected under §112, second paragraph, as being indefinite. Specifically, the Examiner contends that claim 9 omits essential structural cooperative relationships of elements, particularly, "the shielding layer position in claim 1 in relation to the claimed vertical DMOSFET and specifically its connection to said first/source [sic] region through said vertical conductor and its positional relation ship [sic] with said gate and second source/drain region" (present Office

Action; page 3, paragraph 2). Applicants respectfully disagree with this contention and assert that a vertical diffused MOS device is just one particular type of MOS device, as set forth generally in claim 1. As such, the cooperative relationships of all essential elements in the device are already set forth in claim 1. The connection arrangement between the shielding structure and the first source/drain region is essentially independent of the specific arrangement of the gate, except that the shielding structure is non-overlapping relative to the gate and is electrically connected to the first source/drain region by way of a connection formed in a region overlying the active area of the device, between the gate and the second source/drain region, as recited in claim 1. Accordingly, claim 9 is not believed to be incomplete for omitting essential structural cooperative relationships of all elements.

For at least the reasons set forth above, Applicants respectfully request withdrawal of the §112 rejection of claim 9.

Claims 1, 2, 5-8, 11-16 and 18 stand rejected under §102(a) as being anticipated by Morikawa. With regard to independent claims 1 and 14, which are of similar scope, the Examiner contends that Morikawa discloses each of the elements set forth in the subject claims. In particular, the Examiner contends that Morikawa teaches “a shielding layer conductor (10) analogous to the claimed shielding layer formed proximate the upper surface of the semiconductor layer and between the gate (3) and the second source/drain region (9), the structure being electrically connected to the first source/drain region by way of a connection comprising a substantially vertical conductor formed in a region of the device overlying an active area of the device between the gate (3) and the second source/drain region (9)” (present Office Action; page 4, first paragraph). Applicants respectfully disagree with these contentions.

Claims 1 and 14 are patentable over the prior art of record in that Morikawa fails to teach or suggest at least a shielding layer structure formed proximate the upper surface of the semiconductor layer between the gate and the second source/drain region and configured in the manner set forth in the subject claims. More specifically, Morikawa fails to disclose a shielding structure which is electrically connected to the first source/drain region by way of a connection comprising a substantially vertical conductor formed in a region of the device overlying an active area of the

device between the gate and the second source/drain region. While Morikawa discloses that the connection to the source region is made via a contact hole (17) through the silicon oxide film (12) overlying the active area, connection to the shield conductive film (10), which the Examiner analogizes to the shielding structure of the claimed invention, is not made over the active area. Instead, Morikawa clearly describes the connection to the shield conductive film as being made by way of a contact hole (18) formed outside the active area of the device. Morikawa, at column 6, lines 5-13, states:

The wiring 13 constitutes a source electrode and is electrically connected to the n-type semiconductor region (source) 5 . . . via a contact hole 17 formed in the silicon oxide film 12. This wiring 13 is also electrically connected to the shield conductive film 10 via a contact hole 18, which is formed in the silicon oxide film 12 provided over the field oxide film 2 surrounding an active region L. (Morikawa; FIG. 1; emphasis added)

It is well known by those skilled in the art that the field oxide (also referred to as thick oxide) region is not an active region of the device (e.g., wherein transistors are formed). Furthermore, the wiring (13) in Morikawa is substantially horizontal, being “formed over the MOSFET via a silicon oxide film 12” (Morikawa: col. 6, lines 4-5), and is thus not “substantially vertical,” as required by claims 1 and 14. Consequently, the wiring (13) taught by Morikawa cannot reasonably be analogized to the connection which electrically connects to the shielding structure of the claimed invention. It is the specific configuration of this connection to the shielding structure which effectively enhances the benefits of the traditional shielding structure. This arrangement is not taught or suggested by the prior art.

For at least the foregoing reasons, Applicants submit that claims 1 and 14 are patentable over the prior art. Accordingly, favorable reconsideration and allowance of these claims are respectfully solicited.

With regard to claims 2, 5-8 and 11-13, which depend from claim 1, and claims 15, 16 and 18, which depend from claim 14, Applicants submit that these claims are also patentable over the prior art of record by virtue of their dependency from their respective base claims, which are believed to be patentable for at the least the reasons given above. Furthermore, one or more of these claims

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define additional patentable subject matter in their own right. Accordingly, claims 2, 5-8, 11-13, 15, 16 and 18 are believed to be patentable over the prior art, not merely by virtue of their dependency from respective claims 1 and 14, but also in their own right. Accordingly, favorable reconsideration and allowance of these claims are respectfully requested.

Claims 3, 4, 10 and 17 stand rejected under §103(a) as being unpatentable over Morikawa. The Examiner acknowledges that Morikawa is “silent on the claimed method of forming said conductive trace” (claims 3 and 4), and is “silent about the gate/source capacitance behavior in view of the existence of said shielding layer” (claims 10 and 17) (present Office Action; page 5, paragraphs 3 and 4). However, with regard to claims 3 and 4, the Examiner contends that “[t]he use as claimed cannot be practiced with a materially different product” (present Office Action; page 5, paragraph 3). Furthermore, with regard to claims 10 and 17, the Examiner contends that “it would have been obvious to one skilled in the art to safely assume that the shielding layer has no impact in that capacitance due to the constant positional [sic] with the source region in relation to the gate electrode” (present Office Action; page 5, paragraph 4). Applicants respectfully disagree with these contentions.

Claims 3, 4 and 10, which depend from claim 1, and claim 17, which depends from claim 14, are patentable over the prior art of record by virtue of their dependency from their respective base claims, which are believed to be patentable for at the least the reasons given above. Furthermore, one or more of these claims define additional patentable subject matter in their own right. For example, claims 10 and 17, which are of similar scope, further define the shielding structure as being formed relative to the gate “such that a capacitance between the gate and the second source/drain region is minimized without substantially increasing a capacitance between the gate and the first source/drain region.” The cited prior art fails to teach or suggest at least this additional feature of the invention. Accordingly, favorable reconsideration and allowance of claims 3, 4, 10 and 17 are respectfully requested.

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In view of the foregoing, Applicants believe that pending claims 1-18 are in condition for allowance, and respectfully request withdrawal of the §112, §102 and §103 rejections.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Wayne L. Ellenbogen". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Date: August 4, 2005

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Attachment: Replacement Sheet of Formal Drawings
Annotated Sheet Showing Changes

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OXIDE

P+ TRENCH SINKER

114

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P+ enh 116

SOURCE 128

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P-ch 126

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